

SIMILAR SHAPES

SIMILARITY

MENSURATION
(LAST PART)

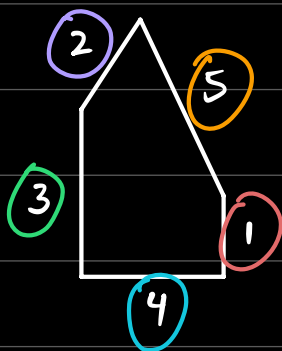
CONDITIONS FOR BEING SIMILAR

1- AAA

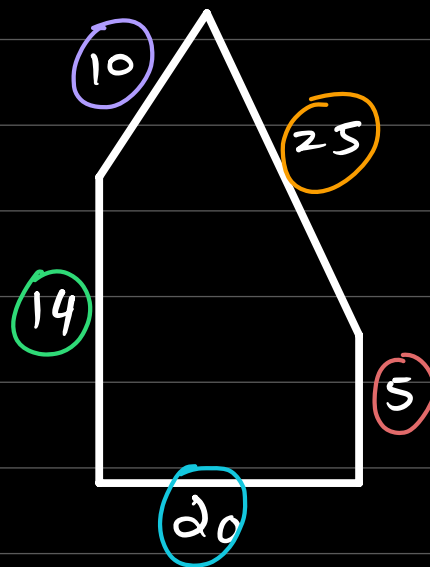
If all angles of two shapes are equal these shapes are called similar.

2. Ratio of corresponding sides is equal

Q: Check whether these two shapes are similar:



Shape 1

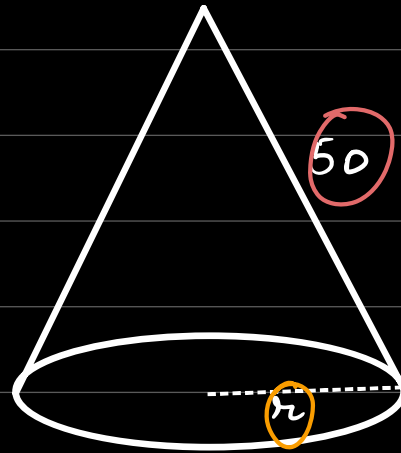
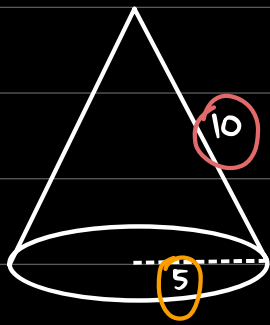


Shape 2

Shape 2	20	5	25	10	14
Shape 1	4	1	5	2	3
	5	5	5	5	Not 5

Shapes are not similar.

Q.



Cone 1 and cone 2 are similar. Find r .

$$\frac{5}{r} = \frac{10}{50}$$

$$r = 25$$

IF TWO SHAPES ARE SIMILAR
THEY FOLLOW THESE FORMULAS

AREA

$\text{cm}^2, \text{m}^2, \text{km}^2$

$$\frac{A_1}{A_2} = \left(\frac{L_1}{L_2} \right)^2$$

ratio of one pair of corresponding sides.

VOLUME

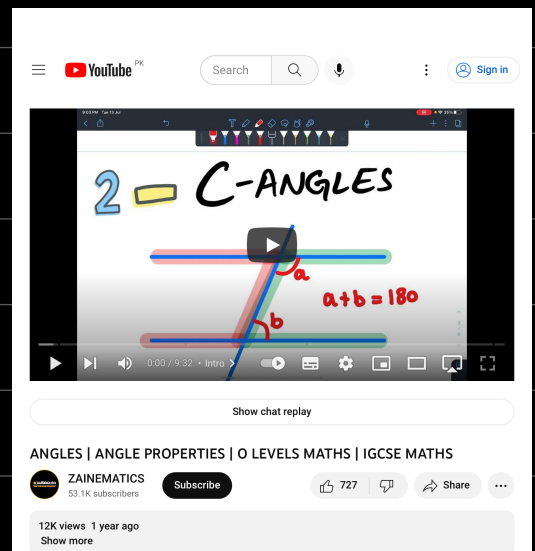
$\text{mm}^3, \text{cm}^3, \text{m}^3, \text{litres}$

$$\frac{V_1}{V_2} = \left(\frac{L_1}{L_2} \right)^3$$

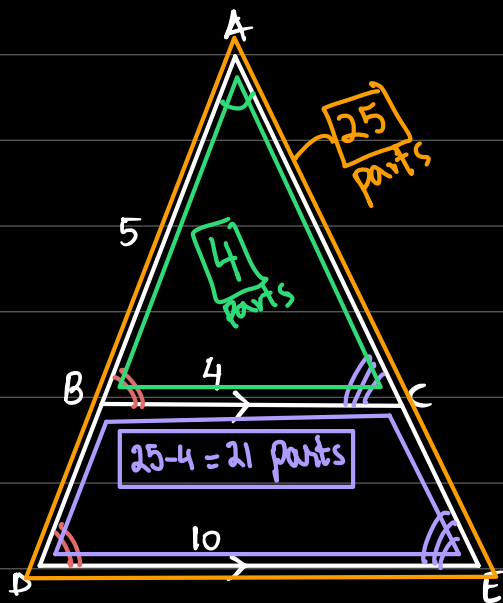
MASS

grams, kg

$$\frac{M_1}{M_2} = \left(\frac{L_1}{L_2} \right)^3$$



Q.

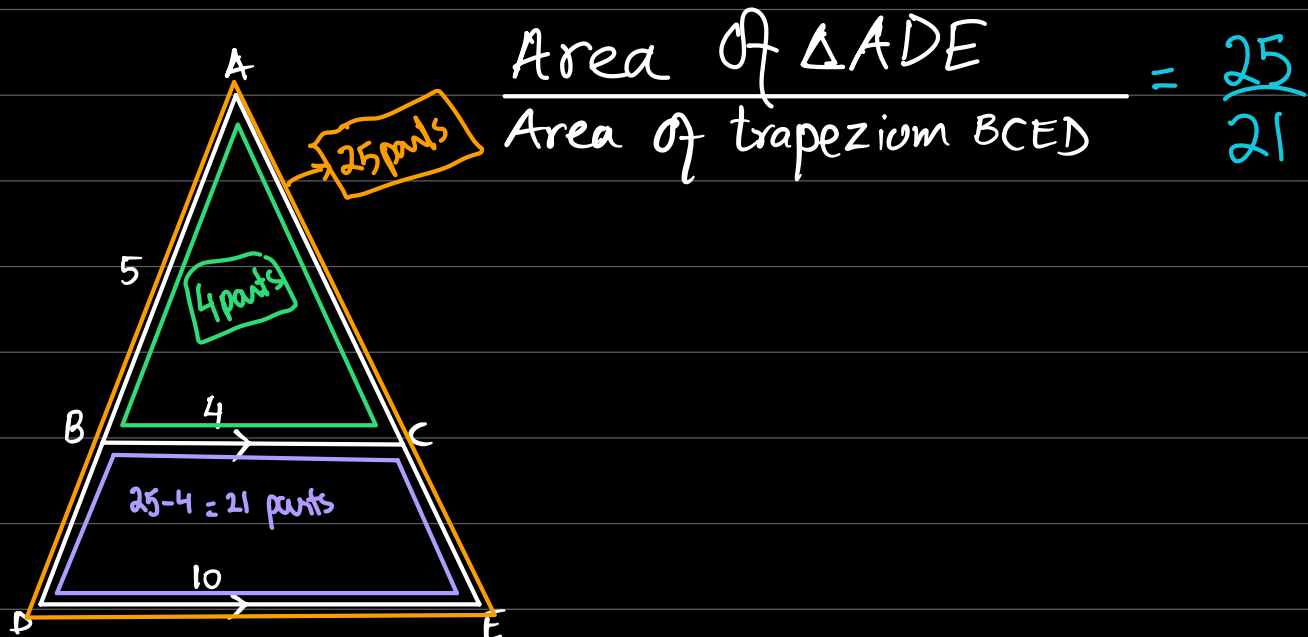


(i) Prove that $\triangle ABC$ is similar to $\triangle ADE$

- 1) $\angle BAC = \angle DAE$ (common angle)
- 2) $\angle ABC = \angle ADE$ (corresponding angles)
- 3) $\angle BCA = \angle DEA$ (corresponding angles)
- 4) Hence by AAA property,
 $\triangle ABC$ is similar to $\triangle ADE$

iii) Find ratio $\frac{\text{Area of } \triangle ABC}{\text{Area of } \triangle ADE} = \left(\frac{L_1}{L_2}\right)^2 = \left(\frac{4}{10}\right)^2 = \frac{4}{25} = \frac{\triangle ABC}{\triangle ADE}$

(iii) Find ratio $\frac{\text{Area of } \triangle ABC}{\text{Area of trapezium BCED}} = \frac{4}{21}$



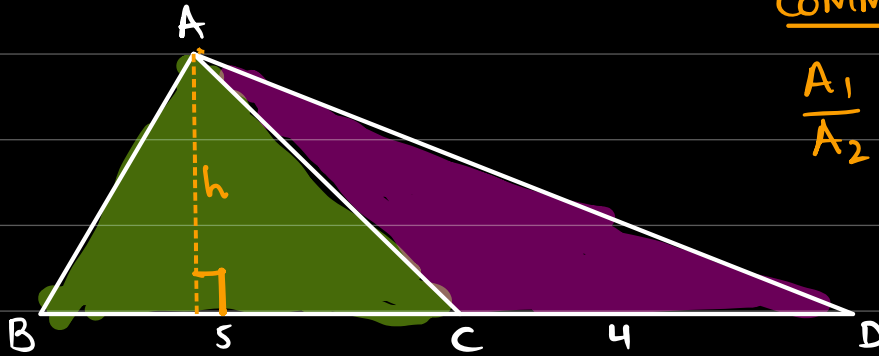
$\frac{\text{Area of } \triangle ADE}{\text{Area of trapezium BCED}} = \frac{25}{21}$

Special Case FOR RATIO OF AREA OF TRIANGLES

Ratio of area of triangles that are NOT SIMILAR

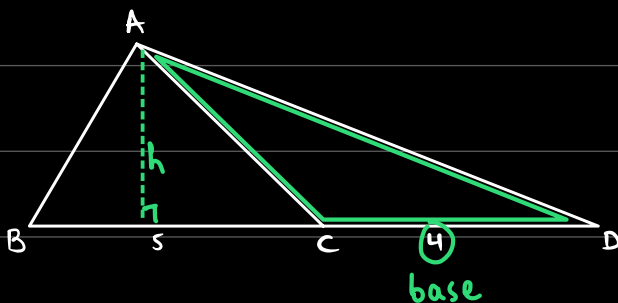
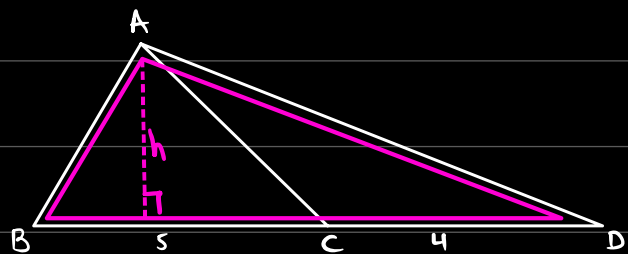
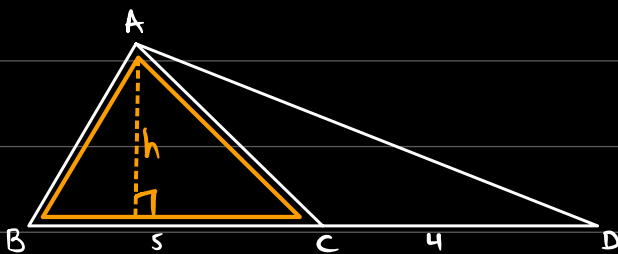
COMMON HEIGHT

$$\frac{A_1}{A_2} = \frac{\text{base}_1}{\text{base}_2}$$



Find Ratio of $\frac{\text{area of } \triangle ABC}{\text{area of } \triangle ABD} = \frac{\text{base}_1}{\text{base}_2} = \frac{5}{9}$

Find ratio of $\frac{\text{area of } \triangle ABC}{\text{area of } \triangle ACD} = \frac{\text{base}_1}{\text{base}_2} = \frac{5}{4}$



Ratio of area of triangles

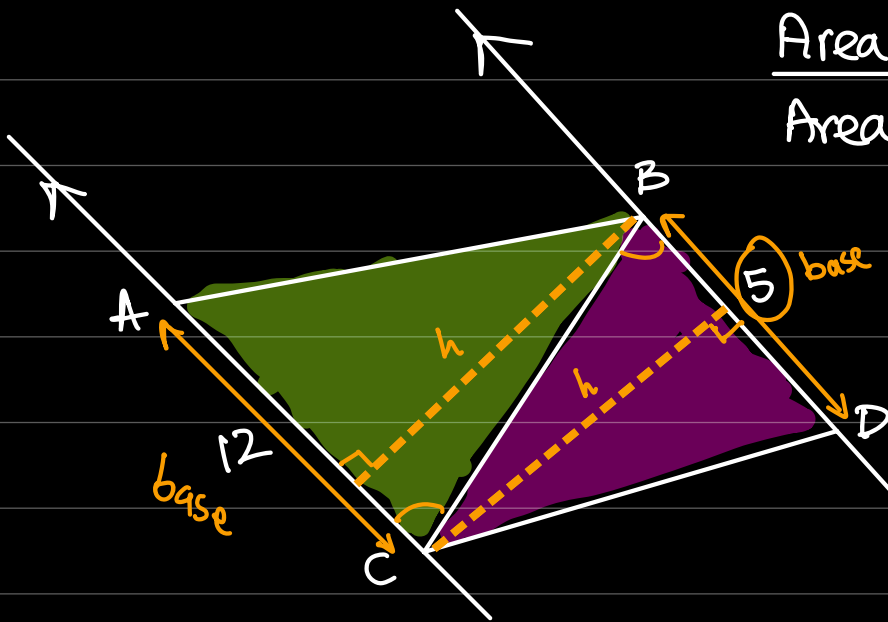
SIMILAR

$$\frac{A_1}{A_2} = \left(\frac{L_1}{L_2}\right)^2$$

NOT SIMILAR

Now they must have a ^(same) common height.

$$\frac{A_1}{A_2} = \frac{\text{base}_1}{\text{base}_2}$$



$$\frac{\text{Area of } \triangle ABC}{\text{Area of } \triangle BCD} = \frac{\text{base}_1}{\text{base}_2} = \frac{12}{5}$$

Both heights are same because distance between parallel lines stays same.